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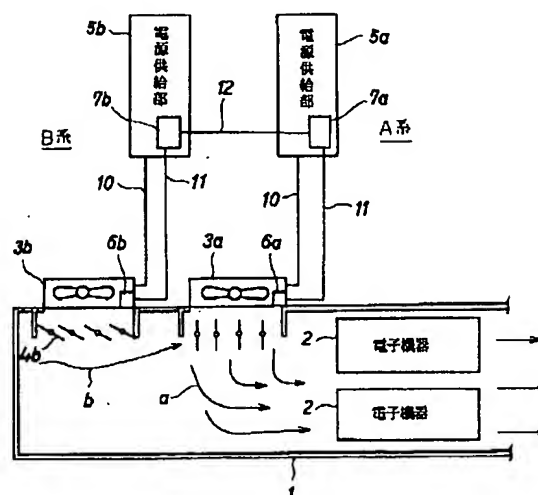
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(54)【発明の名称】 電子機器の冷却装置

(57)【要約】

【目的】 故障発生時あるいは点検時においても、機器の動作停止を必要とせず半永久的な冷却動作を可能とした高信頼性の冷却装置を提供する。

【構成】 電子機器の冷却を行なう2以上のファン3a、3bと、各ファンに対して電源供給を行なう2以上の電源供給手段5a、5bと、各ファンに設けられ、ファンの回転数が一定以下となった時に異常信号を出力する異常検出手段6a、6bと、各電源供給手段に設けられ、一のファンの異常検出手段からの異常信号が入力しまたは電源供給手段の電源異常を検出した場合に、電源供給を停止すると共に他のファンの電源供給手段に対して電源供給開始信号を出力する制御手段7a、7bとを備えた。



【特許請求の範囲】

【請求項1】 電子機器の冷却を行なう2以上のファンと、該各ファンに対して電源供給を行なう2以上の電源供給手段と、前記各ファンに設けられ、ファンの回転数が一定以下となった時に異常信号を出力する異常検出手段と、前記各電源供給手段に設けられ、前記一のファンの異常検出手段からの異常信号が入力しまたは前記電源供給手段の電源異常を検出した場合に、電源供給を停止すると共に他のファンの電源供給手段に対して電源供給開始信号を出力する制御手段とを備えたことを特徴とする電子機器の冷却装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、電子機器の強制空冷を行なう冷却装置に関するものである。

【0002】

【従来の技術】従来、この種の電子機器の冷却装置の構成を図2に示す。

【0003】通気ダクト21の一方にファン23を備え、他方に冷却を行なう電子機器22、22が設置してある。また、ファン23には電源供給ライン24を介して電源供給を行なう電源供給部26が設けられている。ファン23の回転により発生する冷却風を通気ダクト21を介して電子機器22に送り込むことにより、冷却を行なうものである。

【0004】ところで、電子機器のうち公共設備の制御機器、大量生産ライン制御機器等の故障発生時の影響が大きい機器では、機器またはその内部部品や装置を2重化して故障時に対応できるようにしている。このような機器においては、故障発生が多い部分は、主に回転体等の機械的摩耗が生じ易い部分や熱影響による材質の変化が生じ易い部分等である。従って、上記冷却装置のファン23及び電源供給部26も、故障の発生しやすい部分に含まれる。

【0005】機器の内部部品や内部装置の2重化を行なう場合には、本来冷却装置も同時に2重化する必要があるが、冷却装置と大きさあるいは形状が合わないことが多く、また大型の電子機器では内部部品、装置の点数が多いために冷却装置のみを2重化できないことが多い。従って、冷却装置を含んだ2重化機器を実現するには、図2に示すように電子機器22、22を2つ用意して切り替えながら使用する以外に方法がないのが現状である。

【0006】このように機器22、22を2つ用意して切り替えながら使用する場合においても、冷却装置に故障が発生した場合には、機器の発熱等を防止するために、機器の動作を中止する必要があるが、故障対策として電子機器22、22を2つ用意したことが無駄となり稼働効率の低下を招いていた。冷却装置の故障のみならず、点検あるいは修理においても、同様の問題があっ

た。

【0007】また、2重化しない機器においても、冷却装置によって信頼性及び連続稼働時間が決ってくるため、冷却装置の高信頼性が重要となっている。

【0008】

【発明が解決しようとする課題】上述したように従来の冷却装置では、冷却装置のファン等が故障した場合には、機器の発熱あるいは火災を防止するために機器の動作を中止しなければならず、稼働効率の低下を招くといった問題がある。

【0009】また、冷却装置のファンは、摩耗等による寿命があるため、定期点検や交換が必要となるが、その際にも機器の動作を中止する必要があり稼働効率が低下が問題となっている。

【0010】本発明は、上記の様な欠点を改善するために提案されたものであり、故障発生時にあるいは点検時においても、機器の動作停止を必要とせず半永久的な冷却動作を可能とした高信頼性の冷却装置を提供することを目的とする。

【0011】

【課題を解決するための手段】上記目的を達成するため本発明による電子機器の冷却装置は、電子機器の冷却を行なう2以上のファンと、該各ファンに対して電源供給を行なう2以上の電源供給手段と、前記各ファンに設けられ、ファンの回転数が一定以下となった時に異常信号を出力する異常検出手段と、前記各電源供給手段に設けられ、前記一のファンの異常検出手段からの異常信号が入力しまたは前記電源供給手段の電源異常を検出した場合に、電源供給を停止すると共に他のファンの電源供給手段に対して電源供給開始信号を出力する制御手段とを備えたことを特徴とする。

【0012】

【作用】本発明では、動作しているファンに異常が発生した場合、または電源供給手段に異常が発生した場合に、当該ファンへの電源供給を停止して他のファンへの電源供給を行なって冷却動作を継続することで、機器全体の動作停止を行なう必要がなくなる。また、点検、修理については、停止している側のファン及び電源供給手段について行なえばよいので、この場合も機器全体の動作停止の必要はない。

【0013】

【実施例】以下、本発明の実施例について図面を参照して詳細に説明する。図1は本発明の一実施例による冷却装置の構成を示すブロック図である。図において、通気ダクト1の一方に冷却を行なう対象である電子機器2、2が設置され、通気ダクト1の他方に本実施例による2重化した構成の冷却装置が設置されている。

【0014】本冷却装置は、通気ダクト1に並べて設置された2つのファン3a、3bと、各ファン3a、3bに取付けられた逆流防止弁4a、4bと、ファン3a、

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3 bに対してそれぞれ電源を供給する電源供給部5 a、5 bとで構成されている。ここで、ファン3 a、逆流防止弁4 a、電源供給部5 aからなる側をA系、ファン3 b、逆流防止弁4 b、電源供給部5 bからなる側をB系と称する。

【0015】ファン3 a、3 bには、それぞれ羽根の回転数が一定以下の場合にそれを検出して異常信号を出力する異常検出部6 a、6 bが設けられ、電源供給部5 a、5 bには、電源供給の制御を行なう電源制御部7 a、7 bが設けられている。そして、ファン3 a、3 bと電源供給部5 a、5 bが電源供給ライン10で接続され、異常検出部6 a、6 bと電源制御部7 a、7 bとが異常信号ライン11で接続されると共に、電源供給部5 a、5 bの電源制御部7 a、7 bどうしが信号ライン12で接続されている。

【0016】次に、上記の如く構成される本冷却装置の動作を以下に説明する。

【0017】今、図1に示すごとく、A系のファン3 aを駆動して電子機器2、2の冷却を行なっているものとする。この場合、ファン3 aからの冷却風が矢印aのように流れて電子機器2、2に送り込まれ冷却がなされる。また、その際停止しているB系のファン3 bの逆流防止弁4 bが、ファン3 aからの矢印bで示すような流れの送風圧力が働いて図示のように閉じた状態となり、ファン3 bから冷却風が漏れるのを防ぐ。

【0018】ここで、何等かの原因でA系のファン3 aの回転数が一定以下に低下したとすると、ファン3 aの異常検出部6 aから異常信号が異常信号ライン11を介して電源供給部5 aの電源制御部7 aに送られる。電源制御部7 aは、ファン3 aに対する電源供給を停止してファン3 aによる冷却を中止すると共に、信号ライン12を介して電源供給の開始を知らせる信号をB系の電源供給部5 bの電源制御部7 bに送る。電源供給の開始信号を受けると、電源供給部5 bからファン3 bに電源が供給され、ファン3 bが回転駆動する。ファン3 bの送風により逆流防止弁4 bが開き、電子機器2、2に対して冷却風が送られる。また、停止したファン3 aの逆流防止弁4 aは、ファン3 bからの送風圧力によって閉じた状態となり、ファン3 aから冷却風が漏れるのを防ぐ。

【0019】また、図1の状態でファン3 aに電源を供

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給している電源供給部5 aに電源異常が発生した場合には、電源制御部7 aがそれを検出し、信号ライン12を介して電源供給の開始を知らせる信号を電源供給部5 bの電源制御部7 bに送り、ファン3 aに対する電源供給を停止する。この場合も、上述と同様ファン3 bによる冷却が開始される。

【0020】本実施例の冷却装置では、上述のように構成されかつ動作することにより、駆動しているA系あるいはB系のファン3 a、3 bまたは電源供給部5 a、5 bに異常が発生した場合、自動的に電源供給を停止し他方の系のファン3 a、3 bによる駆動を開始するようにしたので、冷却動作が途切れることなく継続してなされる。従って、冷却装置の故障により電子機器2、2の動作を停止する必要がなくなる。また、定期点検あるいは修理は、停止している系について行なうようにすれば、点検時に電子機器2、2の動作を停止する必要がなくなる。

【0021】

【発明の効果】以上説明したように本発明の冷却装置によれば、動作しているファンに異常が発生した場合、または電源供給手段に異常が発生した場合に、当該ファンへの電源供給を停止して他のファンへの電源供給を行なって冷却動作を継続するようにしたので、故障時においても機器全体の動作停止を行なう必要がなくなり、機器の稼働効率を向上させることが可能となる。

【0022】また、点検、修理においても、停止している側のファン及び電源供給手段について行なえばよいので、点検時に機器全体の動作停止の必要がなくなる。

【図面の簡単な説明】

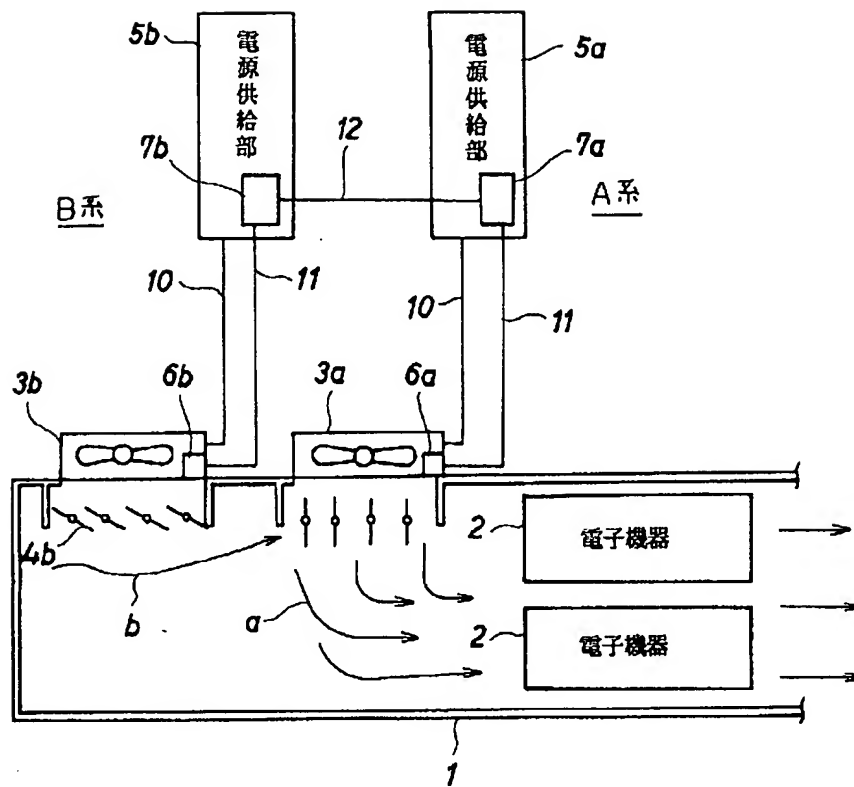
【図1】本発明の一実施例による冷却装置の構成を示すブロック図である。

【図2】従来の冷却装置の構成を示すブロック図である。

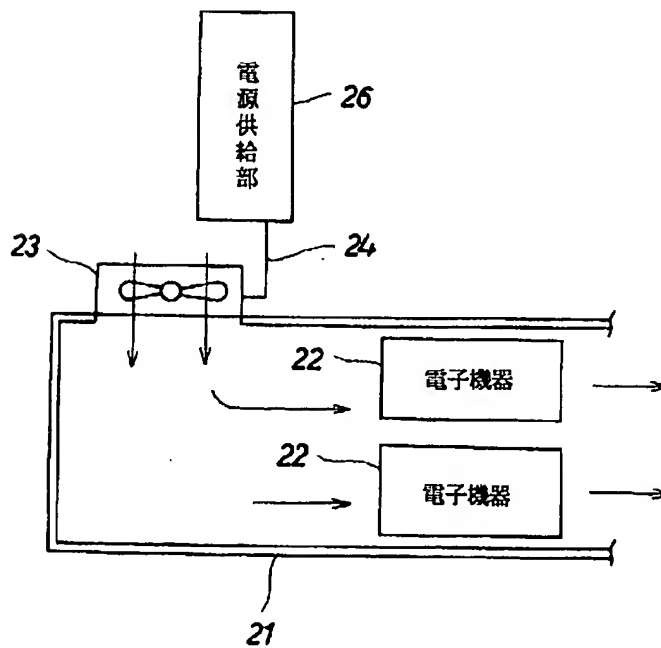
【符号の説明】

- 1………通気ダクト
- 2………電子機器
- 3 a、3 b…ファン
- 4 a、4 b…逆流防止弁
- 5 a、5 b…電源供給部
- 6 a、6 b…異常検出部
- 7 a、7 b…電源制御部

【図1】



【図2】



PATENT ABSTRACTS OF JAPAN

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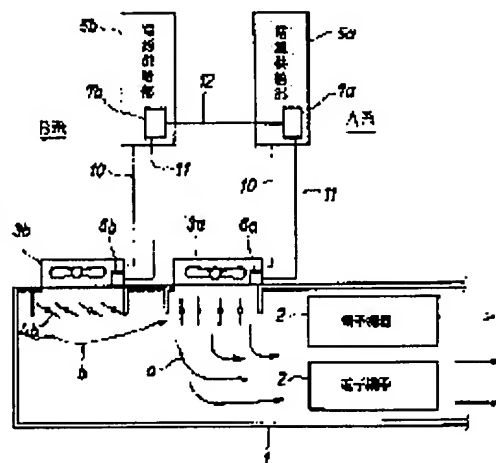
(72)Inventor : OMORI AKIMITSU

(54) COOLER OF ELECTRONIC APPARATUS

(57)Abstract:

PURPOSE: To provide a high-reliability cooler which enables semi-permanent cooling action with need of no action stop of an apparatus even when failure occurs or inspection is made.

CONSTITUTION: The following are provided: two or more fans 3a, 3b which cool an electronic apparatus; two or more power supply means 5a, 5b which supply power source to the respective fans; and abnormality detection means 6a, 6b which are provided to the respective fans and output abnormality signal when the number of fan rotation becomes predetermined or less. Further provided are control means 7a, 7b which are provided to the power supply means and stop power supply and output power supply start signal to other fan power supply means when abnormality signal enters from the abnormality detection means of one fan or the power abnormality of the power supply means is detected.



LEGAL STATUS

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application converted registration]

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[Date of registration]

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decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] Two or more fans who cool electronic equipment, and two or more current supply means to perform current supply to this each fan, A malfunction detection means to output an abnormality signal when it is prepared for said each fan and a fan's rotational frequency becomes below fixed, When it is prepared in said each current supply means, and the abnormality signal from the malfunction detection means of said fan of 1 inputs or the powerfail of said current supply means is detected The cooling system of the electronic equipment characterized by having the control means which outputs a current supply start signal to other fans' current supply means while suspending current supply.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the cooling system which performs forced-air cooling of electronic equipment.

[0002]

[Description of the Prior Art] Conventionally, the configuration of the cooling system of this kind of electronic equipment is shown in drawing 2.

[0003] One side of the aeration duct 21 is equipped with a fan 23, and the electronic equipment 22 and 22 which cools on another side is installed. Moreover, the current supply section 26 which performs current supply through current supply Rhine 24 is prepared for the fan 23. It cools by sending into electronic equipment 22 the cooling wind generated by rotation of a fan 23 through the aeration duct 21.

[0004] By the way, the effect of [at the time of failure generating of the control equipment of a public facility, a mass-production-method LC device etc.] duplex-izes a device, or its internal components and equipment, and enables it to correspond by the large device among electronic equipment at the time of failure. In such a device, the parts with much failure generating are the part which mechanical wear, such as body of revolution, mainly tends to produce, a part which change of the quality of the material by the thermal effect tends to produce. Therefore, the fan 23 and the current supply section 26 of the above-mentioned cooling system are also contained in the part which failure tends to generate.

[0005] To perform duplex-ization of the internal components of a device, or interior equipment, it is necessary to also duplex-ize a cooling system to coincidence essentially but, and that a cooling system, magnitude, or a configuration does not suit in many cases, by large-sized electronic equipment, since there are many mark of internal components and equipment, -izing only of the cooling system cannot be carried out [duplex] in many cases. Therefore, in order to realize the duplex-ized device containing a cooling system, the present condition is that there is no approach besides using it, preparing and changing two electronic equipment 22 and 22 as shown in drawing 2.

[0006] Thus, when using it, preparing and changing two devices 22 and 22 and failure occurs in a cooling system, in order to prevent generation of heat of a device etc., actuation of a device needed to be stopped, it became useless to have prepared two electronic equipment 22 and 22 as troubleshooting, and it had caused decline in operation effectiveness. There was same problem also not only in failure of a cooling system but in check or repair.

[0007] Moreover, also in the device which is not duplex-ized, since dependability and continuous duty time amount are decided with a cooling system, the high-reliability of a cooling system is important.

[0008]

[Problem(s) to be Solved by the Invention] As mentioned above, when the fan of a cooling system etc. breaks down in the conventional cooling system, in order to prevent generation of heat or the fire of a device, actuation of a device must be stopped, and there is a problem of causing decline in operation effectiveness.

[0009] Moreover, although routine inspection and exchange are needed since the fan of a cooling system

has a life by wear etc., it is necessary to stop actuation of a device and the fall poses [operation effectiveness] a problem also in that case.

[0010] this invention is proposed in order to improve the above faults -- having -- the time of failure generating -- or it aims at offering the cooling system of the high-reliability which did not need a halt of a device of operation at the time of check, but enabled semipermanent cooling actuation.

[0011]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the cooling system of the electronic equipment by this invention Two or more fans who cool electronic equipment, and two or more current supply means to perform current supply to this each fan, A malfunction detection means to output an abnormality signal when it is prepared for said each fan and a fan's rotational frequency becomes below fixed, When it is prepared in said each current supply means, and the abnormality signal from the malfunction detection means of said fan of 1 inputs or the powerfail of said current supply means is detected While suspending current supply, it is characterized by having the control means which outputs a current supply start signal to other fans' current supply means.

[0012]

[Function] When abnormalities occur to the fan who is operating, or when abnormalities occur for a current supply means, it becomes unnecessary to perform a halt of the whole device of operation by this invention by suspending the current supply to the fan concerned, performing current supply to other fans, and continuing cooling actuation. Moreover, since what is necessary is just to carry out about the near fan and the near current supply means which it has stopped about check and repair, there is no need for a halt of the whole device of operation also in this case.

[0013]

[Example] Hereafter, the example of this invention is explained to a detail with reference to a drawing. Drawing 1 is the block diagram showing the configuration of the cooling system by one example of this invention. In drawing, the electronic equipment 2 and 2 which is the object which cools to one side of the aeration duct 1 is installed, and the cooling system of the configuration of having duplex-ized by this example is installed in another side of the aeration duct 1.

[0014] This cooling system consists of two fans 3a and 3b put in order and installed in the aeration duct 1, check valves 4a and 4b attached in each fans 3a and 3b, and the current supply sections 5a and 5b which supply a power source to Fans 3a and 3b, respectively. Here, the side which consists of A system and fan 3b, check valve 4b, and current supply section 5b the side which consists of fan 3a, check valve 4a, and current supply section 5a is called B system.

[0015] When the rotational frequency of a wing is below fixed, respectively, the malfunction detection sections 6a and 6b which detect it and output an abnormality signal are prepared for Fans 3a and 3b, and the power control sections 7a and 7b which control current supply are formed in the current supply sections 5a and 5b. And while the current supply sections 5a and 5b are connected with Fans 3a and 3b in current supply Rhine 10 and the malfunction detection sections 6a and 6b and the power control sections 7a and 7b are connected by the abnormality signal line 11, power control section 7a of the current supply sections 5a and 5b and 7b are connected by the signal line 12.

[0016] Next, actuation of this cooling system constituted is explained below like the above.

[0017] Now, as shown in drawing.1 , fan 3a of A system shall be driven and electronic equipment 2 and 2 shall be cooled. In this case, the cooling wind from fan 3a flows like an arrow head a, it is sent into electronic equipment 2 and 2, and cooling is made. Moreover, it will be in the condition of the blast pressure force of flow as check valve 4of fan 3b of B system stopped in that case b shows by the arrow head b from fan 3a having worked, and having closed like illustration, and will prevent a cooling wind leaking from fan 3b.

[0018] Here, supposing the rotational frequency of fan 3a of A system falls to below fixed by a certain cause, an abnormality signal will be sent to power control section 7of current supply section 5a a through the abnormality signal line 11 from malfunction detection section 6of fan 3a a. Power control section 7a sends the signal which tells initiation of current supply through a signal line 12 to power control section 7of current supply section 5b of B system b while it suspends the current supply to fan 3a

and stops cooling by fan 3a. If the start signal of current supply is received, a power source will be supplied to fan 3b from current supply section 5b, and fan 3b will carry out a rotation drive. Check valve 4b opens by ventilation of fan 3b, and a cooling wind is sent to electronic equipment 2 and 2. Moreover, check valve 4 of stopped fan 3a will be in the condition of having closed according to the blast pressure force from fan 3b, and will prevent a cooling wind leaking from fan 3a.

[0019] Moreover, when a powerfail occurs in current supply section 5a which supplies the power source to fan 3a in the state of drawing 1, power control section 7a detects it, and suspends current supply [as opposed to delivery and fan 3a for the signal which tells initiation of current supply through a signal line 12] to power control section 7 of current supply section 5b. Also in this case, cooling by fan 3b is started like ****.

[0020] In the cooling system of this example, since current supply is suspended automatically and the drive by the fans 3a and 3b of the system of another side was started when abnormalities occurred in Fans 3a and 3b or the current supply sections 5a and 5b of A system currently driven by being constituted as mentioned above and operating, or B system, it is made continuously, without cooling actuation breaking off. It becomes unnecessary therefore, to suspend actuation of electronic equipment 2 and 2 by failure of a cooling system. If it is made to perform routine inspection or repair about a stopped system, it will become unnecessary moreover, to suspend actuation of electronic equipment 2 and 2 at the time of check.

[0021]

[Effect of the Invention] Since the current supply to the fan concerned is suspended, current supply to other fans is performed and cooling actuation was continued as explained above when abnormalities occurred to the fan who is operating according to the cooling system of this invention, or when abnormalities occurred for a current supply means, it becomes possible for it to become unnecessary to perform a halt of the whole device of operation at the time of failure, and to raise the operation effectiveness of a device.

[0022] Moreover, also in check and repair, since what is necessary is just to carry out about the near fan and the near current supply means which it has stopped, the need for a halt of the whole device of operation is lost at the time of check.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] This invention relates to the cooling system which performs forced-air cooling of electronic equipment.

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PRIOR ART

[Description of the Prior Art] Conventionally, the configuration of the cooling system of this kind of electronic equipment is shown in drawing 2 .

[0003] One side of the aeration duct 21 is equipped with a fan 23, and the electronic equipment 22 and 22 which cools on another side is installed. Moreover, the current supply section 26 which performs current supply through current supply Rhine 24 is prepared for the fan 23. It cools by sending into electronic equipment 22 the cooling wind generated by rotation of a fan 23 through the aeration duct 21.

[0004] By the way, the effect of [at the time of failure generating of the control equipment of a public facility, a mass-production-method LC device etc.] duplex-izes a device, or its internal components and equipment, and enables it to correspond by the large device among electronic equipment at the time of failure. In such a device, the parts with much failure generating are the part which mechanical wear, such as body of revolution, mainly tends to produce, a part which change of the quality of the material by the thermal effect tends to produce. Therefore, the fan 23 and the current supply section 26 of the above-mentioned cooling system are also contained in the part which failure tends to generate.

[0005] To perform duplex-ization of the internal components of a device, or interior equipment, it is necessary to also duplex-ize a cooling system to coincidence essentially but, and that a cooling system, magnitude, or a configuration does not suit in many cases, by large-sized electronic equipment, since there are many mark of internal components and equipment,-izing only of the cooling system cannot be carried out [duplex] in many cases. Therefore, in order to realize the duplex-ized device containing a cooling system, the present condition is that there is no approach besides using it, preparing and changing two electronic equipment 22 and 22 as shown in drawing 2 .

[0006] Thus, when using it, preparing and changing two devices 22 and 22 and failure occurs in a cooling system, in order to prevent generation of heat of a device etc., actuation of a device needed to be stopped, it became useless to have prepared two electronic equipment 22 and 22 as troubleshooting, and it had caused decline in operation effectiveness. There was same problem also not only in failure of a cooling system but in check or repair.

[0007] Moreover, also in the device which is not duplex-ized, since dependability and continuous duty time amount are decided with a cooling system, the high-reliability of a cooling system is important.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the current supply to the fan concerned is suspended, current supply to other fans is performed and cooling actuation was continued as explained above when abnormalities occurred to the fan who is operating according to the cooling system of this invention, or when abnormalities occurred for a current supply means, it becomes possible for it to become unnecessary to perform a halt of the whole device of operation at the time of failure, and to raise the operation effectiveness of a device.

[0022] Moreover, also in check and repair, since what is necessary is just to carry out about the near fan and the near current supply means which it has stopped, the need for a halt of the whole device of operation is lost at the time of check.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] As mentioned above, when the fan of a cooling system etc. breaks down in the conventional cooling system, in order to prevent generation of heat or the fire of a device, actuation of a device must be stopped, and there is a problem of causing decline in operation effectiveness.

[0009] Moreover, although routine inspection and exchange are needed since the fan of a cooling system has a life by wear etc., it is necessary to stop actuation of a device and the fall poses [operation effectiveness] a problem also in that case.

[0010] this invention is proposed in order to improve the above faults -- having -- the time of failure generating -- or it aims at offering the cooling system of the high-reliability which did not need a halt of a device of operation at the time of check, but enabled semipermanent cooling actuation.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the cooling system of the electronic equipment by this invention Two or more fans who cool electronic equipment, and two or more current supply means to perform current supply to this each fan, A malfunction detection means to output an abnormality signal when it is prepared for said each fan and a fan's rotational frequency becomes below fixed, When it is prepared in said each current supply means, and the abnormality signal from the malfunction detection means of said fan of 1 inputs or the powerfail of said current supply means is detected While suspending current supply, it is characterized by having the control means which outputs a current supply start signal to other fans' current supply means.

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OPERATION

[Function] When abnormalities occur to the fan who is operating, or when abnormalities occur for a current supply means, it becomes unnecessary to perform a halt of the whole device of operation by this invention by suspending the current supply to the fan concerned, performing current supply to other fans, and continuing cooling actuation. Moreover, since what is necessary is just to carry out about the near fan and the near current supply means which it has stopped about check and repair, there is no need for a halt of the whole device of operation also in this case.

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EXAMPLE

[Example] Hereafter, the example of this invention is explained to a detail with reference to a drawing. Drawing 1 is the block diagram showing the configuration of the cooling system by one example of this invention. In drawing, the electronic equipment 2 and 2 which is the object which cools to one side of the aeration duct 1 is installed, and the cooling system of the configuration of having duplex-ized by this example is installed in another side of the aeration duct 1.

[0014] This cooling system consists of two fans 3a and 3b put in order and installed in the aeration duct 1, check valves 4a and 4b attached in each fans 3a and 3b, and the current supply sections 5a and 5b which supply a power source to Fans 3a and 3b, respectively. Here, the side which consists of A system and fan 3b, check valve 4b, and current supply section 5b the side which consists of fan 3a, check valve 4a, and current supply section 5a is called B system.

[0015] When the rotational frequency of a wing is below fixed, respectively, the malfunction detection sections 6a and 6b which detect it and output an abnormality signal are prepared for Fans 3a and 3b, and the power control sections 7a and 7b which control current supply are formed in the current supply sections 5a and 5b. And while the current supply sections 5a and 5b are connected with Fans 3a and 3b in current supply Rhine 10 and the malfunction detection sections 6a and 6b and the power control sections 7a and 7b are connected by the abnormality signal line 11, power control section 7a of the current supply sections 5a and 5b and 7b are connected by the signal line 12.

[0016] Next, actuation of this cooling system constituted is explained below like the above.

[0017] Now, as shown in drawing 1, fan 3a of A system shall be driven and electronic equipment 2 and 2 shall be cooled. In this case, the cooling wind from fan 3a flows like an arrow head a, it is sent into electronic equipment 2 and 2, and cooling is made. Moreover, it will be in the condition of the blast pressure force of flow as check valve 4of fan 3b of B system stopped in that case b shows by the arrow head b from fan 3a having worked, and having closed like illustration, and will prevent a cooling wind leaking from fan 3b.

[0018] Here, supposing the rotational frequency of fan 3a of A system falls to below fixed by a certain cause, an abnormality signal will be sent to power control section 7of current supply section 5a a through the abnormality signal line 11 from malfunction detection section 6of fan 3a a. Power control section 7a sends the signal which tells initiation of current supply through a signal line 12 to power control section 7of current supply section 5b of B system b while it suspends the current supply to fan 3a and stops cooling by fan 3a. If the start signal of current supply is received, a power source will be supplied to fan 3b from current supply section 5b, and fan 3b will carry out a rotation drive. Check valve 4b opens by ventilation of fan 3b, and a cooling wind is sent to electronic equipment 2 and 2. Moreover, check valve 4of stopped fan 3a a will be in the condition of having closed according to the blast pressure force from fan 3b, and will prevent a cooling wind leaking from fan 3a.

[0019] Moreover, when a powerfail occurs in current supply section 5a which supplies the power source to fan 3a in the state of drawing 1, power control section 7a detects it, and suspends current supply [as opposed to delivery and fan 3a for the signal which tells initiation of current supply through a signal line 12] to power control section 7of current supply section 5b b. Also in this case, cooling by fan 3b is

started like ****.

[0020] In the cooling system of this example, since current supply is suspended automatically and the drive by the fans 3a and 3b of the system of another side was started when abnormalities occurred in Fans 3a and 3b or the current supply sections 5a and 5b of A system currently driven by being constituted as mentioned above and operating, or B system, it is made continuously, without cooling actuation breaking off. It becomes unnecessary therefore, to suspend actuation of electronic equipment 2 and 2 by failure of a cooling system. If it is made to perform routine inspection or repair about a stopped system, it will become unnecessary moreover, to suspend actuation of electronic equipment 2 and 2 at the time of check.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the configuration of the cooling system by one example of this invention.

[Drawing 2] It is the block diagram showing the configuration of the conventional cooling system.

[Description of Notations]

1 Aeration duct

2 Electronic equipment

3a, 3b -- Fan

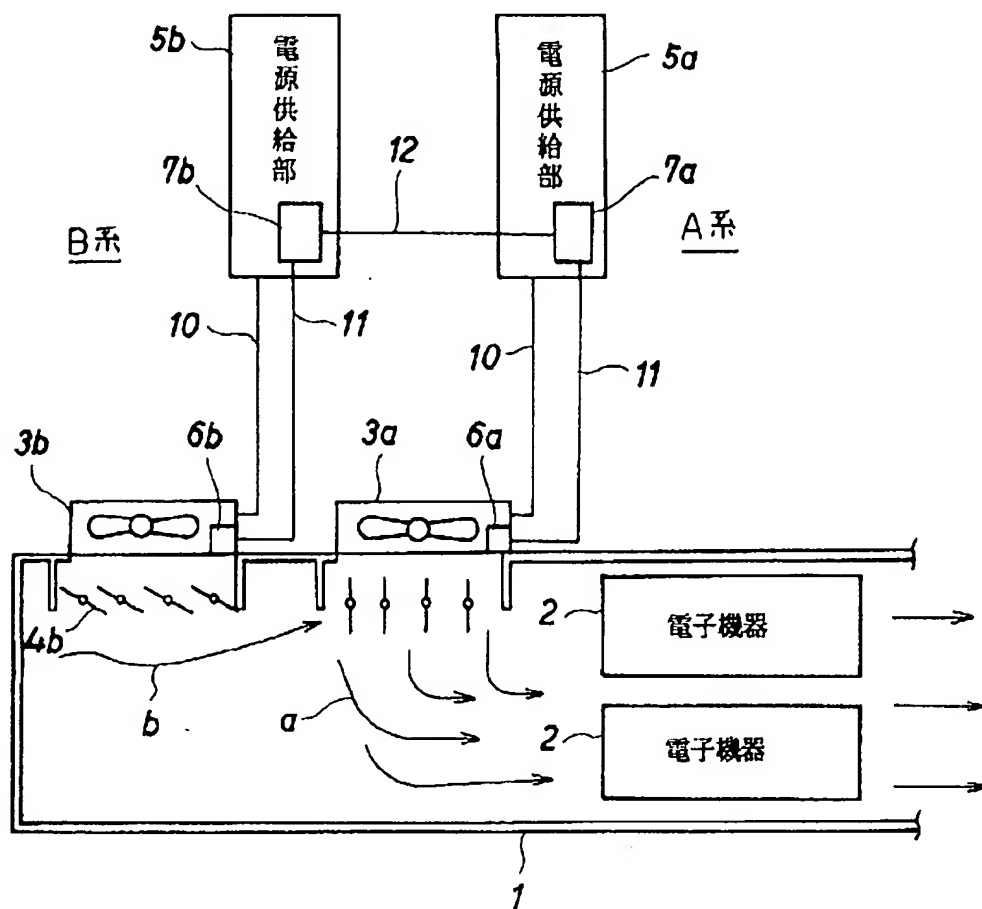
4a, 4b -- Check valve

5a, 5b -- Current supply section

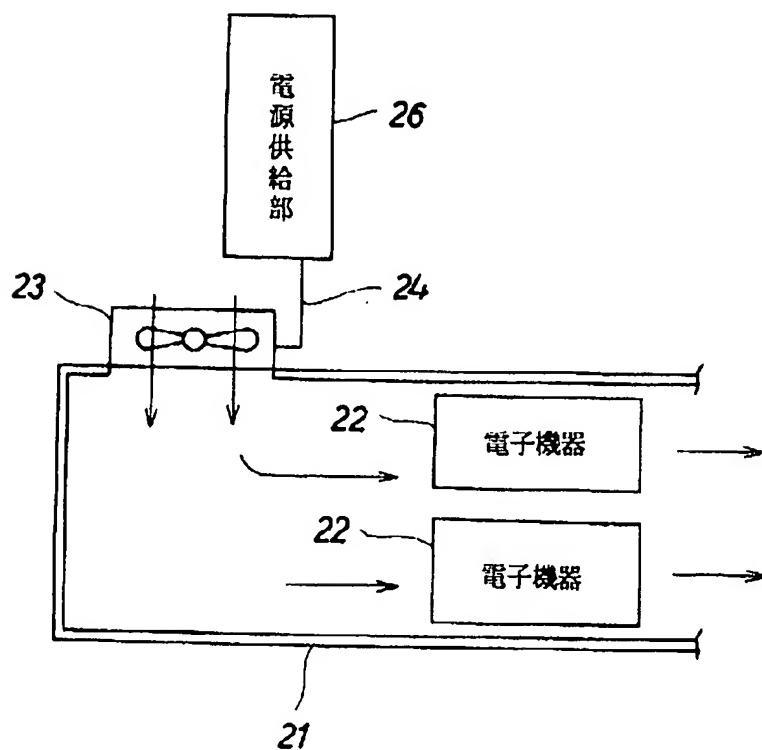
6a, 6b -- Malfunction detection section

7a, 7b -- Power control section

[Translation done.]

Drawing selection drawing 1

[Translation done.]

Drawing selection 

[Translation done.]